

## 2021 KWSE-AKCSE Webinar

Personal Information			
First Name	Jihyun	Last Name	Lee
Highest Degree	Ph.D.	Year Earned	2016
Organization	University of Calgary	Position	Assistant Professor
Field of Expertise	Mechatronics, Manufacturing, Robotics, sensors		
Title of Presentation	Mechatronics application for sustainable manufacturing		
Abstract			
<p>The global trend of Industry 4.0 is realizing the true automation era. This innovation, however, is only possible when technologies in companies are ready. Manufacturing automation in the aerospace, automotive, semiconductor industries is highly desired, but lots of challenges still need to be solved. This seminar will introduce several technologies recently interested in industries and academics related to the machine's performance improvement and automation. Primary topics are the following: (1) Robot Machining. (2) Force measurement built-in sensors (3) Vibration absorbers. In the first topic, this research proposes a novel method to increase the rigidity of the serial robots for machining application. The second research topic proposes a novel force measuring device in the form of a vise with built-in piezoelectric sensors and strain gauges to measure multi-axial clamping and cutting forces simultaneously. In the final topic, Dr. Lee proposed to reformulate the optimization problem into LTI control framework by using extra cascade control inputs for simultaneously optimizing linear variables and non-linear variable. The optimized multiple TMDs were implemented into commercialized machine tools and evaluated in the experiment. The results showed that the dynamic stiffness of machine tools with multiple TMDs can improve up to 82%.</p>			
Biosketch			
<p>Dr. Jihyun Lee is an Assistant Professor of Mechanical and Manufacturing Engineering at the University of Calgary in Canada. Dr. Lee has worked in the mechatronics field for ten years. Her research on mechatronic systems has resulted in two knowledge and technology translations and over ten journal papers. Dr. Lee serves as the PI for six domestic and international research projects for developing a hybrid robotic system, digital twin models and sensors. She has collaborated with the Korea Institute of Machinery and Materials in South Korea to develop a smart device. Dr. Lee has collaborated with many industry partners such as EXERGY Solution in Alberta, GN Corporation in Airdrie, Alberta, Doosan Machine Tools, SMEC, and Dukin Corp. in South Korea. Dr. Lee received a B.S. from Yonsei University and MS.c/Ph.D. from the University of Michigan-Ann Arbor. After graduation, she worked for 2.5 years as a senior researcher in the department of ultra-precision machines and systems at the Korea Institute of Machinery and Materials in Korea, where she contributed to manufacturing and mechatronics. Dr. Lee joined the University of Calgary in 2019 then is leading a research group, intelligent automation research laboratory (iAR Lab).</p>			